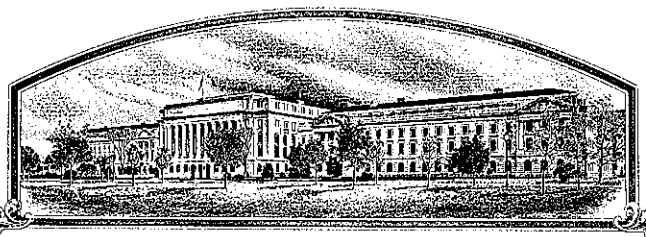


No. 9600102

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

NDSU Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED, PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR [S]TOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT [VA]RIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN [TH]E UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF [CE]RTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF [TH]E. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'2398'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this thirtieth day of April in the year of our Lord one thousand nine hundred and ninety-six.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions.* FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a).

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
NDSU Research Foundation

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER
SBE398
XW398A4

3. VARIETY NAME
2398

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
P.O Box 5014
Fargo, ND 58105-5014

5. TELEPHONE *(include area code)*
701-231-8931

6. FAX *(include area code)*
701-231-1013

FOR OFFICIAL USE ONLY

PVPO NUMBER
9600102

FILING DATE
Jan 16, 1996

FEES RECEIVED
FILING AND EXAMINATION FEE: $ 2450.00
DATE 1-16-96
CERTIFICATION FEE: $ 300.00
DATE 3-26-96

7. GENUS AND SPECIES NAME
Triticum aestivum L.

8. FAMILY NAME *(Botanical)*
Gramineae

9. CROP KIND NAME *(Common name)*
Hard Red Spring Wheat

10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)* *(Common name)*
NDSU Research Foundaton - Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
NDSU Research Foundation = 501(c)(3)
Foundation, ND

12. DATE OF INCORPORATION
May 1989

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Richard C. Frohberg
Department of Plant Sciences
North Dakota State University
Fargo, ND 58105

14. TELEPHONE *(include area code)*
701-231-8143

15. FAX *(include area code)*
701-231-8474

16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow instructions on reverse)*

a. [X] Exhibit A. Origin and Breeding History of the Variety
b. [X] Exhibit B. Statement of Distinctness
c. [X] Exhibit C. Objective Description of the Variety
d. [X] Exhibit D. Additional Description of the Variety
e. [X] Exhibit E. Statement of the Basis of the Applicant's Ownership
f. [X] Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in a public repository)*
g. [X] Filing and Examination Fee ($2,460), made payable to "Treasurer of the United States" *(Mail to PVPO)*

17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)?*
[X] YES *(If "yes," answer items 18 and 19 below)* [ ] NO *(If "no," go to item 20)*

18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
[X] YES [ ] NO

19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
[X] FOUNDATION [ ] REGISTERED [X] CERTIFIED

20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
[X] YES *(If "yes," give names of countries and dates)* [ ] NO
USA. Released 16 March 1995

21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*		SIGNATURE OF APPLICANT *(Owner(s))*	
Dale Zetocha			
NAME *(Please print or type)*		NAME *(Please print or type)*	
Dale Zetocha			
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
Executive Director NDSU Research Foundation	1/9/96		/

EXHIBIT A: ORIGIN AND BREEDING HISTORY

'2398' HARD RED SPRING WHEAT

(Revised February 21, 1996)

The original cross and early development of **'2398'** was conducted by Dr. Ian Edwards, Pioneer Hi-Bred International, Inc., Plant Breeding Division, Glyndon Cereal Research Station, Route 1, Box 128A, Glyndon, MN 56547. In 1990, this Pioneer breeding material was gifted to the NDSU Research Foundation, Fargo, ND 58105. Subsequent development, beginning in 1990, was conducted by Dr. Richard Frohberg, North Dakota State University (NDSU).

The abbreviated parentage of **'2398'** is MN7357/SD2903.

MN7357 was an experimental line from the University of Minnesota.
Pedigree = Crim/Era*2//MN6923'S'

SD2903 was an experimental line from South Dakota State University.
Pedigree = Spring/Winter Composite = one selection from a mixture of crosses; exact pedigree unknown (listed as such in 1982 URN-HRS Report).

The procedure used to develop **'2398'** was as follows:

1984	- F1 generation: grown at Glyndon, MN. Assigned code number SBE398.
1984 - 85	- F2 generation: single heads selected at Yuma, AZ winter nursery.
1985	- F3 generation: head rows from Yuma single head selections were planted at Glyndon, MN. Single head selections were taken from selected rows.
1985 - 86	- F4 generation: single head selections grown at Yuma, AZ winter nursery. Individual rows were selected.
1986	- F4 generation: Four selections of SBE398 were grown at Glyndon, MN.
1987	- F5 generation: SBE398A in New B Purities trial as #41S302-003, Glyndon, MN.
1987 - 88	- F6 generation: SBE398A in New B Purities trial as #41S302-003,Yuma, AZ winter nursery head rows. Designated as #41S201-005 for 1988 purity trials
1988	- F7 generation: SBE398A in New B Purities trial as #41S201-05, Glyndon, MN.
1988 - 89	- F8 generation: SBE398A in Advanced Purity trials, Hawaii, Spring '89.
1989	- F9 generation: SBE398A selection identified as ADV PUR SEL 4 GN89, Glyndon, MN. Designation changed to SBE398A4.
1990	- F10 generation: SBE398A4 became property of NDSU Research Foundation by gift from Pioneer Hi-Bred. Entered in North Dakota State University Elite yield trials by Dr. Richard Frohberg at 4 University research locations in ND.
1991	- SBE398A4 designation changed to XW398A4. Entered in NDSU HRSW variety trial at 5 locations in ND and in URN - HRS Wheat Nursery at 21 locations in Upper Midwest and Canada. Seed increase to 130 lbs conducted at NDSU Agronomy Seed Farm, Casselton, ND

1992 - XW398A4 entered in NDSU HRSW variety trial at 7 locations in ND and in URN - HRS Wheat Nursery at 20 locations in Upper Midwest and Canada. Entered in Spring Wheat Quality Advisory Council test at 2 locations. Seed increase in ND by NDSU Foundation Seedstocks Project.

1993 - XW398A4 entered in NDSU HRSW variety trial at 6 locations in ND and in URN - HRS Wheat Nursery at 21 locations in Upper Midwest and Canada. Entered in Spring Wheat Quality Advisory Council test at 4 locations. Seed increase in ND by NDSU Foundation Seedstocks Project.

1994 - XW398A4 entered in NDSU HRSW variety trial at 6 locations in ND. Seed increase in ND by NDSU Foundation Seedstocks Project.

1995 - XW398A4 entered in NDSU HRSW variety trial at 7 locations in ND. Seed increase conducted by selected commercial seed growers under contract to Foundation Seedstocks Project.

March 16, 1995 - XW398A4 released by NDSU Research Foundation as named cultivar, **2398.**

Observations from 1989 to 1994 for six generations (F_9 to F_{14}) indicate that **2398** is uniform and stable within commercially acceptable limits for all traits as described in Exhibit C. Variants (taller plants 5-20 cm) may occur at a frequency of 70/10,000 plants.

EXHIBIT B: NOVELTY STATEMENT

'2398' HARD RED SPRING WHEAT

Exhibits C and D provide information that will identify the variety 2398. 2398 most closely resembles the cultivar 2371 except that it is shorter at maturity (1.0 cm) and has less straw strength. The following characteristics should further differentiate 2398 from 2371:

omitted per letter AAFC 28 Feb 1996

~~1. 2398 has a longer kernel type and higher kernel weight than 2371.~~

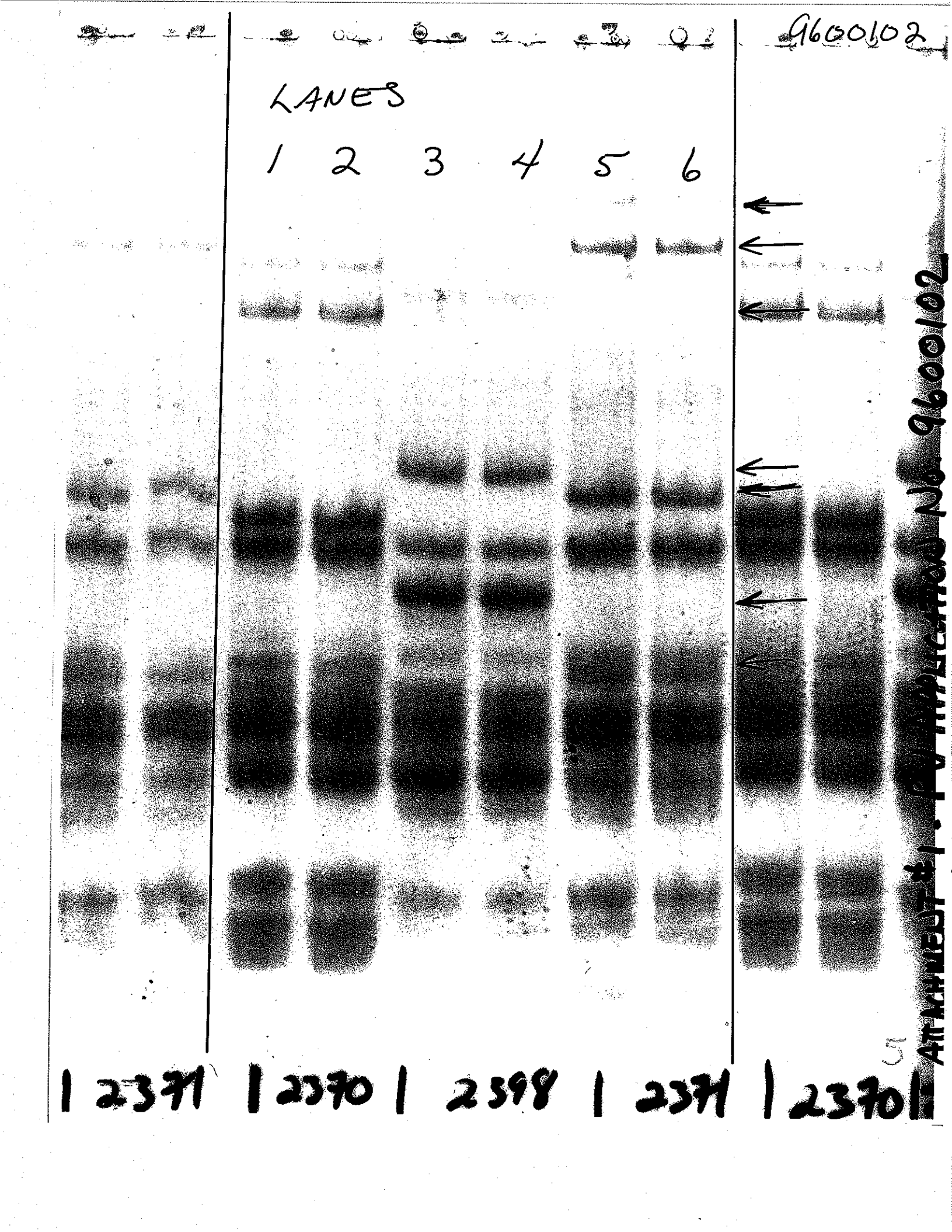
~~2. Wheat protein and wet gluten percentages of 2398 average 1.0 and 4.4% less, respectively, than 2371.~~

~~3. 2398 is susceptible to Scab (Fusarium spp.); 2371 is less susceptible to Scab than 2398.~~

4. Distinct differences exist between certain high molecular weight proteins of 2398 compared to 2371.

as per letter 23 Feb 1996 MAS.

'2398' differs from '2371' in gel electrophoresis patterns as shown in Attachment 1


96G0102
LANES
1 2 3 4 5 6
1 2371 | 2370 | 2398 | 2371 | 2370
ATTACHMENT # 1 TO AMENDMENT NO. 96G0102

FORM APPROVED: OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
COMMODITIES SCIENTIFIC SUPPORT DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*TRITICUM SPP.*)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
NDSU Reserach Foundation

ADDRESS (*Street and No. or R.F.D. No., City, State, and ZIP Code*)
P.O. Box 5041
Fargo, ND 58105-5041

FOR OFFICIAL USE ONLY

PVPO NUMBER
9600102

VARIETY NAME OR TEMPORARY DESIGNATION
2398

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. KIND:
[1] 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:
[1] 1 = SPRING 2 = WINTER 3 = OTHER (*Specify*) _____ [2] 1 = SOFT 2 = HARD 3 = OTHER (*Specify*) _____
[2] 1 = WHITE 2 = RED 3 = OTHER (*Specify*) _____

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:
[0][5][6] FIRST FLOWERING [0][6][0] LAST FLOWERING

4. MATURITY (*50% Flowering*):
[0][1] NO. OF DAYS *EARLIER* THAN ..... [3] 1 = ARTHUR 2 = SCOUT 3 = CHRIS
[ ][ ] NO. OF DAYS *LATER* THAN ..... [ ] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT (*From soil level to top of head*):
[0][8][1] CM. HIGH
[ ][ ] CM. TALLER THAN ..... [ ]
[1][9] CM. SHORTER THAN ..... [3] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING (*See reverse*):
[2] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:
[1] 1 = YELLOW 2 = PURPLE

8. STEM:
[1] Anthocyanin: 1 = ABSENT 2 = PRESENT
[2] Waxy bloom: 1 = ABSENT 2 = PRESENT
[1] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT
[1] Internodes: 1 = HOLLOW 2 = SOLID
[0][3] NO. OF NODES (*Originating from node above ground*)
[2][1] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:
[1] Anthocyanin: 1 = ABSENT 2 = PRESENT
[2] Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:
[1] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER (*Specify*): _____
[2] Flag leaf: 1 = NOT TWISTED 2 = TWISTED
[1] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT
[2] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT
[1][3] MM. LEAF WIDTH (*First leaf below flag leaf*)
[2][3] CM. LEAF LENGTH (*First leaf below flag leaf*):

6
9600102

9600102

11. HEAD:

[1] Density: 1 = LAX 2 = DENSE

[1] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) _____

[4] Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

[7] Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER (Specify): tan

[0][6] CM. LENGTH [0][9] MM. WIDTH

12. GLUMES AT MATURITY:

[2] Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.)

[2] Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.)

[4] Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

[2] Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

[1] 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

[2] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

[1] Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

[2] Cheek: 1 = ROUNDED 2 = ANGULAR

[2] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

[1] Brush: 1 = NOT COLLARED 2 = COLLARED

[4] Phenol reaction (See Instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

[3] Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____

[0][6] MM. LENGTH [0][3] MM. WIDTH [4][2] GM. PER 1000 SEEDS

17. SEED CREASE:

[2] Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

[2] Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[2] STEM RUST (Races) Local

[2] LEAF RUST (Races) Local

[0] STRIPE RUST (Races) _____

[0] LOOSE SMUT

[0] POWDERY MILDEW

[0] BUNT

[2] OTHER (Specify) _____

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SAWFLY

[0] APHID (Bydv.)

[0] GREEN BUG

[0] CEREAL LEAF BEETLE

[ ] OTHER (Specify) _____

HESSIAN FLY RACES: [0] GP [0] A [0] B [0] C [0] D [0] E [0] F [0] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	2371	Seed size	Kulm
Leaf size	2371	Seed shape	Norlander
Leaf color	2371	Coleoptile elongation	2371
Leaf carriage	2371	Seedling pigmentation	2371

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Wallis, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

7

EXHIBIT D: ADDITIONAL DESCRIPTION OF VARIETY

'2398' HARD RED SPRING WHEAT

'2398'is resistant to the predominant races of leaf rust and stem rust found in the Upper Midwest, USA. It is only moderately susceptible to the leaf spotting complex, similar to "Amidon', 'Norm' and 'Bergen'.

The milling and baking qualities of **'2398'** is typical for Hard Red Spring Wheat for the production of bakery bread flour. When compared to '2371', the variety **'2398'** has lower wheat protein and flour protein percentages. **'2398'** has better crum color, a lower wet gluten percentage and lower loaf volume. **'2398'** has a higher farinogram classification than '2371'. Also, the farinogram mixing properties of '2398' are stronger than '2371'.

Table 1. Summary of agronomic performance of selected entries in the 1991-94 hard red spring wheat variety trial at North Dakota Agricultural Research Centers.

Variety or line	Headed (30)‡	Height (30)	Lodging score (14)	Rust†		Leaf disease (17)	Shatt-ering (2)	Test weight (29)	Grain yield (27)
				Leaf (1)	Stem (1)				
	days	cm	0-9	%	%	%	%	lb/bu	bu/A
Semidwarf									
2375	62	84	1.8	40R-tMR	5RMR	40	2	59.8	55.2
Prospect	63	80	0.6	30R-tMR	10MSS	42	Tr	57.8	49.9
Vance	65	85	0.9	20R	0	39	Tr	57.0	48.1
Gus	64	87	0.8	20R-5MR	0	34	Tr	57.8	47.6
Grandin	62	85	1.0	20R-tMR	5R	40	Tr	59.1	50.8
Bergen	63	77	0.4	20R-5MR	0	22	Tr	57.6	51.8
2370	62	82	0.6	15R-tMR	tRMR	35	Tr	58.6	50.1
2371	64	82	0.6	20R-tMS	tR	30	1	57.7	50.1
Dalen	62	78	0.6	15R-5MR	0	32	Tr	59.1	49.7
Krona	65	78	0.5	30R	0	29	Tr	56.6	52.3
Norm	63	82	0.7	20R-tMR	0	26	Tr	57.5	51.8
XW398A4	64	81	1.0	30R-tMR	0	25	Tr	58.0	54.9
Conv. Ht.									
Stoa	63	96	1.8	10R-tMR	0	37	1	58.1	51.5
Butte 86	60	88	1.7	15R-5MR	tR	40	Tr	59.4	51.9
Amidon	63	94	1.9	15R-tMR	tR	29	0	58.5	49.5
Sharp	60	86	2.1	10R	0	36	Tr	60.8	51.5
Kulm	60	90	1.2	15R-tMR	0	44	Tr	60.4	52.3

† Rust data - Fargo 1993.
‡ Number of tests each trait.

Table 2. Summary of agronomic performance of selected entries in the Uniform Regional Hard Red Spring wheat Nursery, 1991-93.

Variety or line	Headed‡ (47)§	Height (51)	Lodging score (24)	Rust† Leaf (1)	Rust† Stem (1)	Leaf disease (13)	Test weight (49)	Grain yield (52)
	days	cm	1-9	%	%	1-9	lb/bu	bu/A
Era	33	81	2.2	30MS-S	0	4.8	55.4	47.3
Stoa	30	94	2.9	10MR-MS	0	5.5	57.5	52.1
Butte 86	27	87	2.8	10MR-MS	5R-MR	5.4	58.9	52.7
ND671	26	90	2.1	tR-MR	tR	6.6	59.8	52.6
XW398A4	31	80	2.3	10MR-MS	tR	5.5	57.3	55.1

† Data from 1993 rust nursery, USDA-ARS, Cereal Rust Laboratory, St. Paul, MN
‡ Days after June 1.
§ Number of tests each trait.

Table 3. Summary of agronomic performance of selected entries in the Uniform Regional Hard Red Spring Wheat Nursery at locations with *Fusarium* head blight epidemics, 1993.

Variety or line	Headed‡ (7)§	Height (8)	Lodging score (7)	Rust† Leaf (1)	Rust† Stem (1)	Test weight (7)	Grain yield (8)
	days	cm	1-9	%	%	lb/bu	bu/A
Era	40	87	2.5	30MS-S	0	52.3	31.5
Stoa	36	101	2.9	10MR-MS	0	54.7	43.0
Butte 86	33	92	2.8	10MR-MS	5R-MR	56.3	43.9
ND671	33	97	2.0	tR-MR	tR	57.4	47.7
XW398A4	36	87	2.8	10MR-MS	tR	52.8	36.2

† Data from 1993 rust nursery, USDA-ARS, Cereal Rust Laboratory, St. Paul, MN
‡ Days after June 1.
§ Number of test each trait.

Table 4. Disease, severity, and incidence of *Fusarium* head blight in selected entries in a field inoculated nursery of the Uniform Regional Hard Red Spring Wheat trial at St. Paul, MN 1991-93.

	1991		1992 St. Paul			1993 St. Paul		
Variety or line	St. Paul severity	Morris† score	Disease‡	Severity	Incidence	Disease	Severity	Incidence
	%	1-9	%	%	%	%	%	%
Era	24	2.3	22.2	26	85	26.7	28	97
Stoa	11	6.3	25.4	29	87	9.7	14	69
Butte 86	12	3.7	5.8	34	17	6.8	13	55
ND671	5	8.3	4.0	15	29	10.0	15	59
XW398A4	34	7.3	10.5	20	51	48.0	48	100
Wheaton	--	--	17.2	22	71	18.0	20	93
Sumai 3	--	--	0.1	4	1	0.2	6	2
LSD .05	NS	1.5	10.0	10	28	7.1	7	15

† Natural infection.
‡ Disease = Severity x Incidence.

Table 5. Analytical, milling and baking data‡ of 1993 crop.†

Variety or Number	WHT PROTEIN								FARINOGRAM				3 HOUR FERMENTATION							
	TEST WT LB/BU	VIT KER %	FAL NO SEC	14% WHT %	MB FLR %	FLR EXT %	WET GLU %	FLR ASH %	PEAK TIME MIN	MIX TOL MIN	MTI BU	CLASS	MIX ABS %	MIX TIME MIN	LOAF DO	LOAF VOL CC	G-T	CB CL	CT CL	SYM
Amidon	58.7	79	368	14.2	13.5	68.2	41.2	0.40	7.7	11.3	36	5.3	67.1	1.70	9.6	853	8.1	7.9	10.0	10.0
Bergen	57.6	54	391	13.6	12.8	69.5	37.7	0.41	8.4	9.8	33	5.0	66.3	1.55	9.3	822	7.7	7.5	10.0	9.4
Butte 86	58.2	71	387	14.7	13.7	67.4	41.6	0.42	8.1	9.7	29	4.9	68.7	1.50	9.9	864	7.9	7.8	10.0	9.6
CDC Teal	58.0	73	398	15.3	14.5	68.1	42.9	0.41	12.6	17.9	17	7.0	67.7	1.70	9.9	949	8.1	8.1	10.0	10.0
Dalen	58.7	67	408	14.4	13.0	68.0	39.0	0.44	8.0	11.7	24	5.6	67.7	1.75	9.9	846	7.6	7.2	10.0	9.4
Express	56.0	62	377	13.7	13.0	66.0	38.8	0.44	8.3	15.4	19	5.9	64.9	1.70	9.6	855	8.1	8.0	10.0	9.6
Grandin	58.3	73	392	14.7	13.9	68.6	39.4	0.42	8.1	17.8	23	6.0	67.5	2.05	9.6	874	8.0	7.7	10.0	9.7
Kulm (ND673)	59.5	74	377	14.3	13.5	68.5	38.7	0.41	17.1	21.8	19	6.7	66.6	2.35	9.7	846	8.1	8.2	10.0	9.6
Len	55.7	71	400	15.0	14.2	67.1	39.7	0.44	10.1	22.3	16	6.7	66.5	2.40	10.0	877	7.9	7.4	10.0	10.0
Sonja	58.1	64	390	14.3	13.3	69.6	38.1	0.41	9.8	14.7	26	6.0	66.1	1.95	9.7	880	8.4	8.6	10.0	10.0
Stoa	57.0	83	389	15.0	14.2	67.1	42.0	0.40	10.2	17.1	23	6.7	65.7	1.90	9.7	874	7.9	8.2	10.0	10.0
2371	57.6	78	336	14.8	14.1	68.7	41.9	0.42	8.6	12.4	28	5.4	67.2	1.90	9.7	885	7.9	8.1	10.0	9.9
2375	58.6	66	397	14.2	13.3	68.2	40.3	0.44	7.8	14.6	29	5.4	67.7	1.60	9.7	851	8.3	8.1	10.0	9.9
2398 (XW398A4)	57.6	52	346	13.8	13.2	69.1	37.1	0.46	9.1	17.6	18	6.4	63.7	2.10	9.9	844	8.1	8.4	10.0	9.4

† The above values were determined by averaging values from Carrington, Casselton, Dickinson, Hettinger, Langdon, Minot, and Williston Research Centers.

‡ North Dakota State University, Agricultural Experiment Station, Department of Cereal Science and Food Technology.

Table 6. Analytical, milling and baking data‡ of 1994 crop.† (Quality attributes (+) or deficiencies (-) compared to Grandin at six stations).

	WHT PROTEIN								FARINOGRAM				3 HOUR FERMENTATION							
	TEST	VIT	FAL	14%	MB	FLR	WET	FLR	PEAK	MIX				MIX		LOAF				
Variety or Number Avg.	WT LB/BU	KER %	NO Sec	WHT %	FLR %	EXT %	GLU %	ASH %	TIME MIN	TOL MIN	MTI BU	CLASS	ABS %	TIME MIN	DO	VOL CC	G-T	CB CL	CT CL	SYM
Grandin	59.5	83	399	14.1	13.3	69.0	38.4	0.42	16.4	20.6	19	6.3	63.2	2.40	9.8	884	7.8	8.0	10.0	9.0
Amidon	0.1	9	2	-0.3	-0.1	-0.6	2.3	0.00	-5.2	-5.4	-15	-0.3	-0.4	-0.45	-0.3	-23	-0.3	-0.2	0.0	-0.8
Bergen	-1.2	-22	10	-1.1	-1.2	1.4	-2.6	-0.03	-4.6	-6.6	-6	-0.3	-1.2	-0.65	-1.0	-1	0.1	-0.1	0.0	0.0
Butte 86	-0.1	6	22	0.2	0.1	-1.8	1.8	0.01	-4.6	-4.0	-1	0.2	1.5	-0.55	0.0	48	0.5	0.5	0.0	0.5
CDC Teal	0.0	1	28	1.2	1.3	-0.5	4.9	0.01	2.8	3.5	6	0.9AB	-0.2	-0.50	-0.1	154	0.6	0.7	0.0	1.0
Dalen	0.6	-5	18	-0.3	-0.7	-1.5	-0.8	-0.01	-4.8	-2.8	-7	0.4	0.6	-0.45	-0.1	-26	-0.3	-0.5	0.0	0.0
Express	-2.4	-9	-35	-0.2	0.0	-2.6	1.8	-0.04	-5.1	-4.5	-1	-0.1	-0.7	-0.65	-2.0	-43	-1.6	-0.7	0.0	-1.7
Kulm (ND673)	1.6	4	13	0.4	0.4	-1.1	3.5	0.04	-4.4	-0.8	-2	0.2	0.4	-0.50	-0.5	62	0.0	0.5	0.0	0.7
Len	-1.0	-2	-2	0.5	0.4	-0.4	0.0	-0.01	-1.4	2.4	1	0.7	-1.8	0.25	0.2	50	0.0	-0.6	0.0	0.5
Sonja	-1.9	-5	-5	-0.7	-0.8	-0.1	-2.7	-0.02	-0.8	-6.7	-11	-0.5	-1.6	-0.25	-1.1	64	0.0	0.1	0.0	0.8
Stoa	-0.9	4	11	0.3	0.4	-2.1	1.8	0.02	-2.0	1.3	1	0.7	-1.1	-0.15	-0.1	0	-0.5	0.1	0.0	-0.5
2371	-1.4	-1	-24	0.0	0.0	0.4	1.0	-0.01	-3.4	-4.8	-10	-0.5	-1.5	-0.35	-0.8	57	-0.5	0.0	0.0	0.3
2375	1.1	0	42	-0.5	-0.7	-0.1	-1.0	0.00	-4.6	-1.2	-7	-0.1	-0.6	-0.55	-0.8	-36	-0.4	0.0	0.0	-0.5
2398 (XW398A4)	-1.1	-18	-24	-1.2	-1.1	0.4	-3.4	-0.06	-2.8	-5.8	-12	-0.3	-2.7	-0.25	-0.8	62	-0.1	0.4	0.0	0.3

† The above values were determined by averaging values from Carrington, Casselton, Dickinson, Hettinger, Langdon, Minot, and Williston Research Centers.
‡ North Dakota State University, Agricultural Experiment Station, Department of Cereal Science and Food Technology.

EXHIBIT E: STATEMENT OF THE BASIS OF APPLICANT'S OWNERSHIP

'2398' HARD RED SPRING WHEAT

The original cross and development of **2398,** beginning in 1981, was conducted by Pioneer Hi-Bred International, Inc., Plant Breeding Division. On July 17, 1990, the hard red spring wheat germplasm specified under Section I. of the accompanying Wheat Donation Agreement was gifted to the NDSU Research Foundation, a North Dakota non-profit corporation, by Pioneer Hi-Bred International. The germplasm, under the Pioneer Code number SBE398A, was part of the F7 and above generation group identified in Section I.D. SBE398A was subsequently developed as the hard red spring wheat variety **2398** by the NDSU Research Foundation, who believes it is the sole owner of this variety for which it solicits a certificate of protection.

WHEAT DONATION AGREEMENT

Agreement made this 17th day of July, 1990 between Pioneer Hi-Bred International, Inc., an Iowa Corporation, with offices at 700 Capital Square, 400 Locust Street, Des Moines, Iowa 50309, (Pioneer) and the NDSU Research Foundation, a North Dakota non-profit corporation, whose address is P. O. Box 5051, State University Station, Fargo, North Dakota 58105-5165 (the Foundation).

RECITALS

Whereas, Pioneer has decided to discontinue its research and development of hard red spring wheat varieties and the marketing and sale of such varieties in North America; and

Whereas, Pioneer desires to ensure the continued availability of said hard red spring wheat varieties and germplasm to the public; and

Whereas, the Foundation has the ability to maintain and develop said varieties and germplasm and to make them available to the public;

Now therefore the parties agree as follows:

I. GERMPLASM

A. Pioneer agrees to donate and assign to the Foundation, all of its right, title and interest including assignment of PVP certificates to the hard red spring wheat varieties listed below:

2369, 2375, 2370 and XW371

B. The donation shall include:

2369	Foundation:	478
	Registered:	14
2370	Breeder Seed:	12
	Foundation:	607
	Registered:	4362
	Head Row Pkts:	3300
	Plot Pkts	201
2375	Breeder Seed:	15
	Foundation:	1189
	Registered:	8170
	Head Row Pkts:	3000
	Plot Pkts:	209

XC371	Breeder Seed:	12
	Foundation:	400
	Head Row Pkts:	5000
	Plot Pkts:	206

C. The Foundation understands and agrees that Pioneer® brand hard red spring wheat varieties will be made available for sale by Pioneer sales representatives through the 1990 sales season.

D. Pioneer agrees to donate to the Foundation all of its right, title, and interest except as restricted in Section II.A. below, to the following hard red spring germplasm lines:

Approximately 2300 F2 and F3 bulk populations;

Approximately 6500 F4, F5, and F6 selected lines;

Approximately 2700 lines of F7 and above generation with seed quantities adequate for yield testing.

including but not limited to seed stock, pedigree information, field books, quality and testing data,

II. RESTRICTIONS

A. The Foundation understands and agrees that the donation of the varieties and germplasm is restricted to development of varieties and sale of seed in North America only. The Foundation agrees to use its best efforts to prevent the distribution of the varieties and germplasm outside of North America.

B. The Foundation will not be permitted to use the name Pioneer® or any other registered trademark or service mark of Pioneer Hi-Bred International, Inc. in any manner whatsoever without the express written permission of Pioneer. The Foundation may use the variety numbers listed on the Plant Variety Protection certificates.

C. It is the hope and desire of Pioneer that the Foundation share the donated varieties and germplasm with other land grant institutions, specifically the University of Minnesota and South Dakota State University.

III. ANNOUNCEMENT AND EFFECTIVE DATE

A. The effective date of this Agreement shall be March 14, 1990.

IV. LIMITATION OF LIABILITY

A. Pioneer makes no warranty express or implied as to the yield, quality or tolerance to diseases, insects, or growing conditions of the varieties or the germplasm.

V. REPRESENTATIVES

A. All notices and correspondence shall be directed to the following representatives:

Pioneer: C. Sue Crum
Manager, Business Development
Pioneer Hi-Bred International, Inc.
317 6th Avenue, Suite 720
Des Moines, Iowa 50309

Foundation: Earl Foster, Chairperson
Crop and Weed Sciences Department
North Dakota State University
Box 5051 State University Station
Fargo, North Dakota 58105-5051

This Agreement constitutes the entire agreement and understanding between the parties and all previous discussions, representations, understandings or agreements are hereby merged in this Agreement.

This Agreement shall be binding upon the legal representatives, successors and assigns of the Parties.

PIONEER HI-BRED INTERNATIONAL, INC.

By _____
Thomas N. Urban, President

By _____
Vice-President Research

NDSU RESEARCH FOUNDATION

By _____
O.L. Ozbun, President

By _____
H. R. Lund, Secretary

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PIONEER HI-BRED INTERNATIONAL, INC.
RESEARCH AND PRODUCT DEVELOPMENT

RESEARCH CENTER
7300 N.W. 62ND AVENUE • P.O. BOX 1004
JOHNSTON, IOWA 50131-1004
PHONE: (515) 270-3600
TELEFAX: (515) 270-4312

February 2, 1996

Dr. LeRoy Spilde
Dept. of Plant Sciences
North Dakota State University
P.O. Box 5051
Fargo, ND 58105

Dear LeRoy:

This is to confirm that as the developer of spring wheat variety 2398, I hold no rights of ownership. All inventions developed by employees of Pioneer Hi-Bred International remain the property of the company; this is part of the employment contract.

Accordingly, when Pioneer made the donation of germplasm to North Dakota State University for use in the public domain in the U.S., the rights of U.S. ownership were transferred to N.D.S.U. We retain the right to use our germplasm outside the U.S. as we see fit.

I hope this will clarify this matter. Let me know if I can be of further assistance.

Sincerely,

Ian B. Edwards
Worldwide Wheat Research Director

IE:djp

ATTACHMENT #2 - PV APPLICATION No. 9600102